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REMARKS

Applicants affirm the provisional election made by applicants' attorney to prosecute the subject matter of claims 1-22 and withdraws, without prejudice to the right to continue to prosecute in divisional patent applications the subject matter of claims 23 through 31.

Applicants have amended claim 1 by restricting the spinel to the formula $MnCr_2O_4$. This is supported by the teaching in the disclosure at page 6 lines 32 and 33. Additionally, applicants have restricted the thickness of the spinel coating to from 0.1 to 10 microns. This is supported by former claims 8, 9, and 10. In view of the amendments to claim 1, claims 8, 9, and 10 have become redundant and have been deleted. Additionally, applicants have specified in claim 1 the surface has a resistance to coke formation when the stainless steel is exposed to a hydrocarbon environment at high temperatures. This is supported by the teaching in the disclosure at page 2 lines 1 to 10; page 5 lines 1 to 10; page 9; and the examples.

The claims which formerly depended on claims 8, 9, and 10 have been amended to depend from claims 5, 6, and 7 respectively.

It is respectfully submitted the amended claims add no new subject matter to the specification and will not necessitate any further search on the part of the examiner. It is respectfully submitted the amended claims are in good order for entry into the specification and the same is respectfully submitted.

The claims presently under consideration are 1 (currently amended), 2, 3, 4, 5, 6, and 7 (original) and 10 through 22 (currently amended).

The examiner rejected the claims formerly on file pursuant to 35 U.S.C. §103.

The application of 35 U.S.C. §103 to the issue of patentability has been considered by the Supreme Court of the United States in Graham v. John Deere 148 USPQ 459. The Supreme Court held that 35 U.S.C. §103 requires a three-pronged inquiry. It is necessary to:

(i) determine the knowledge disclosed in the prior art;

(ii) determine the differences between the teaching of the prior art and the claims at issue; and

(iii) resolve the differences between the teaching of the prior art and the claims in question on the level of the ordinary skill in the art field.

The examiner has rejected claim 1 pursuant to 35 U.S.C. §103 in view of U.S. Patent 5,942,349 issued August 24, 1999 to Badwal et al. taken together with U.S. Patent 6,054,231 issued April 25, 2000 to Virkar et al. Applicants respectfully traverse the examiner's objection.

Both Badwal et al. and Virkar et al. relate to fuel cells and particularly to the resistivity of the surface layer of an interconnect between fuel cells. Neither reference relates to surfaces which have a reduced propensity for coke formation in a hydrocarbon atmosphere at high temperatures. The references are from art fields diverse from the amended claims.

Badwal et al. actually teaches against the subject matter of the present invention. According to Badwal et al. the surface is a metal oxide and there is an intermediate spinel layer between the metal oxide and the metal oxide surface.

(Col. 3 lines 29-33, 46, 50, 60; Col. 4 lines 10-15, 19, 57; Col. 5 lines 4 and 5, 33 and 34, 56; Col. 8 lines10 and 11, and 29 and 30; Col. 9 lines 9 and 48; Col. 10 lines 20, 59 and 60; Col. 11 lines 43 and 66; and Col. 12 lines 31 and 51). Thus one of ordinary skill in the art upon reading Badwal et al. would have the spinel not as the outermost surface as required in the present claims but rather as an intermediate layer below a surface oxide. This is directly against the subject matter of the amended claims currently under consideration.

As noted above Virkar et al. also relates to and interconnector for fuel cells and not to petrochemical processing equipment. The reference teaches the surface layer is predominantly manganese chromite ($MnCr_2O_4$) with a minor amount of MnO (Col. 5 lines 15 to 20). This leads to a surface having the empirical formula $Mn_{1.5}Cr_{1.5}O_4$ (Col.2 lines 35 and 36, 45 and 46; Col. 5 lines 37, 38, 39, 42, 46, 47, 50 and 52). Thus the applied reference teaches away from the subject matter of the amended claims.

As noted above there is a conflict between the teaching of Badwal et al. and Virkar et al. Badwal et al. teaches a spinel of the formula $MnCr_2O_4$ is intermediate the substrate and the surface oxide layer and Virkar et al. teaches the surface layer has the empirical formula $Mn_{1.5}Cr_{1.5}O_4$. Given the divergence of the teachings of both Badwal et al. and Virkar et al. and the different applications fields of both Badwal et al. and Virkar et al. if one of ordinary skill in the art were to combine the references it would demonstrate inventive merit. Further given the different art fields of fuel cell interconnectors and petrochemical processing a potential solution from a divergent art field also

demonstrates inventive merit. Given the test in Graham v John Deere it is respectfully submitted the subject matter of amended claim 1 is inventive over a combination of Badwal et al. and Virkar et al.

The examiner has rejected claims 1 and 2 in view of JP 55 141545 in view of U.S. Patent 5,630,887 issued May 20, 1997 to Benum et al. JP 55 14154 relates to improving the surface corrosion resistance of ferretic steels. The steels have less than 1.5% of Ni which contradicts the teaching of U.S. Patent 5,630,887 to Benum et al. that the steels have 25 to 50% of Ni (Col. 2 lines 23 and example 2). It would not occur to one of ordinary skill in the art to replace the ferritic steel of JP 55 141545 with the stainless steel of Benum et al. To make such a substitution suggests invention.

The reference teaches a method to improve the corrosion resistance of ferritic steels to particularly SO_2 gas. There is nothing in the reference to suggest or teach the surface is resistant to coke formation so there in no good reason to combine the references. Additionally, the Japanese reference teaches the equivalence of Cr_2O_3 with the spinel or the spinel and $MNSiO_3$. Given that the stainless steels of the present invention tend to have a surface of Cr_2O_3 the Japanese reference would suggest doing nothing. You already have the preferred surface on the stainless steel. However, if one of ordinary skill in the art were to follow the Japanese reference one would conclude the thickness of the $MnCr_2O_4$ would be 500 Angstroms. One angstrom is 10^{-10} meters or 10^{-4} microns so the thickness of the surface layer would be up to 0.05 microns, significantly thinner than the 0.1 to 10 microns required by the claims of the

present invention and also significantly thinner than the 20 to 45 micron thickness of the surface of U.S. Patent 5,630,887 to Benum et al.

U.S. Patent 5,630,887 to Benum et al. teaches the surface on the stainless steel should be from 20 to 45, preferably from 25 to 35 microns thick. There is nothing in Benum et al. to suggest the thickness of the coating could be reduced to from 0.1 to 10 microns. This is a substantial and unexpected reduction in thickness in the claims presently under consideration.

Given the divergence of teaching in the Japanese patent (0.05micron thickness of a surface of $MnCr_2O_4$ is equivalent with a 0.0025 thickness of a surface of Cr_2O_3 on a ferritic substrate having less than 1.5% Ni) and U.S. Patent 5,630,887 to Benum et al. (a 20 to 45 micron thickness of a surface of $MnCr_2O_4$ on a stainless steel) one of ordinary skill in the art would not consider combining the references and if they were combined it would demonstrate inventive merit. In view of the foregoing it is respectfully submitted the claims presently under consideration demonstrate inventive merit over the applied references taken individually or in combination. It is respectfully submitted the claims presently under consideration are in good order for allowance and the same is respectfully solicited.

Respectfully submitted,

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